



SCS ENGINEERS















Santa Cruz County Feasibility Study for Alternative Solid Waste Facilities Phase II

Presented To:

Santa Cruz County Public Works Department

2150 N. Congress Dr., No. 117 Nogales, Arizona 85621

Prepared by:

SCS ENGINEERS

4222 East Thomas Road, Suite 310 Phoenix, AZ 85018

> January 29, 2008 Job No. 10200071.14

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1 PROJECT SYNOPSIS

PROJECT EVOLUTION

In April of 2007 SCS Engineers was retained by Santa Cruz County (County) to analyze alternative options to the current landfill ownership and to prepare a presentation of ownership options to the County. Based upon the permitted capacity and projections developed in accordance with the current closure plans, it was determined that the landfill facility was rapidly reaching its capacity. Given the options of divesting itself of the landfill (privatizing) or staying in the post refuse collection business, there was no decision made by the County about privatizing and it was assumed that the County would remain in the post collection business. But to remain in the post collection business, the County understood it had to decide whether to close the existing Rio Rico facility in 2013 and divert the wastes to another location or expand the facility and continue to serve the existing waste shed.

To assist the County in this decision process, SCS Engineers (SCS) was retained by the County to prepare a Phase 1 Fatal Flaw Analysis for Alternative Conceptual Facilities report. The purpose of this work effort was to evaluate replacing the Rio Rico landfill with one of nine multi-phased possible solid waste facility alternative solutions. The purpose of the fatal flaw aspect of the analysis was to identify engineering, economic, or regulatory constraints that would make the implementation of any of the nine potential replacement facilities impractical or impossible. The three highest ranking projects surviving this initial screening would be considered for more through evaluation in a feasibility study. The County selected: 1. Rio Rico vertical landfill expansion, 2. The Town of Patagonia, retro fit (an additional phased horizontal expansion to an existing horizontal design not yet constructed), 3. Site a new landfill, as the three alternatives to the existing facility warranting further study.

It is during this Phase II Feasibly Study that the County requested closer examination of possible designs and their costs for the three selected facilities were conducted. It is the County's intent that the outcome of the Phase II report would provide the County with the basis for project specific preliminary engineering, costs and regulatory compliance evaluation necessary to continue with the final design and construction of a selected facility.

This report represents the findings of the Phase II study, including economic, technical, constraints that must be considered by the County prior to proceeding with further designs and possible implementation. The conclusions and recommendations contained herein are based upon information provided by the County as well as additional information gained from the Arizona Department of Environmental Quality (ADEQ).

Estimated solid waste capacities of each of the three alternatives, both current and projected, must be considered preliminary. It should also be noted that environmental requirements are subjective in nature and cannot be predicted with absolute certainty. Therefore, the recommendations contained herein are for analysis and discussion purposes only and do not represent assurances or guaranties.

SCOPE OF WORK

The scope of work associated with this study is divided into four tasks, as follows: Task 1, Meeting with the County; Task 2, Preliminary Calculations/Estimates, Task 3, Detailed Economic Analysis; and Task 4, Documentation Report/Presentation.

During Task 1, a meeting was conducted with the County on September 7, 2007. The purpose of the meeting was to review the proposed approach to the Phase II study, and to obtain additional data required to perform the Phase II analysis. Subjects discussed during this meeting included the proposed approach to be followed regarding three alternatives. The alternatives were:

- Alternative 1-Rio Rico vertical expansion
- Alternative 2-Town of Patagonia retro-fit
- Alternative 3-New Landfill

It was during this meeting that three additional scenarios were considered possible for the Rio Rico landfill vertical expansion alternative. These additional scenarios to be considered were lateral expansion of the Rio Rico landfill near the existing landfill base; the inclusion of a Material Recovery Facility (MRF) and transfer station to be implemented sometime during the remaining operational life of the Rio Rico landfill.

In Task 2, SCS prepared the development design concepts for each alternative followed up with engineering volume calculations and initial cost estimates for each of the three alternatives where data were available. For the Rio Rico Landfill alternative a mix of three additional costs would be depicted for the horizontal expansion, MRF and transfer station respectfully

Task 3 is a matrix of the additional capacities, years of operation life, and costs associated with each of the three alternatives considered.

Task 4 is the preparation of this report summarizing the results of the Phase II Feasibility Study. Also included in this task is a one-day workshop with the County Supervisors to discuss the findings of the study.

PROJECT SUMMARY

This project is a follow on to the Phase I Fatal Flaw Analysis conducted earlier by SCS Engineers in 2007. Below are the County selected alternatives to be further evaluated during the Phase II study. They are:

Rio Rico Landfill Alternative and Scenario Components

The landfill expansion alternatives considered in this study employ the following solid waste management facilities:

Landfill Horizontal (Lateral) and Vertical Expansions

By definition a lateral expansion means a horizontal expansion of the waste boundaries of an existing municipal solid waste landfill (MSWLF) unit. The vertical expansion can be defined as the vertical extension of the already permitted landfill footprint.

Material Recovery Facility (MRF)

A material recovery facility (MRF) is defined as any facility that collects, compacts, repackages sorts, or processes for transport solid waste for the purpose of recycling. The sorting portion of the separation process may be done manually or by mechanical means.

Transfer Station

A transfer station is defined as a facility with a designated receiving area where waste collection vehicles discharge their loads. The waste is often compacted, then loaded into larger vehicles (usually transfer trailers), for long-haul shipment to a final disposal site – typically a landfill.

Patagonia Retro-fit Alternative

The Patagonia Landfill is located within an area of approximately 80 acres, 23 of which is currently permitted by ADEQ as a MSWLF. There are no infrastructures or utilities at the landfill site, and the access road from the main highway (State Route 82) to the landfill (approximately 1.8 miles) consists of a dirt road, which crosses a creek.

The Patagonia Landfill retro-fit involves a lateral expansion, the addition of infrastructure required for the proper operation of a full-service MSWLF, the addition of utilities, and the improvement of the existing access road, including a bridge over the creek.

New Landfill Alternative

The new landfill alternative involves the siting, permitting, design, and construction of a new landfill to be located within Santa Cruz County. Under this study, SCS will outline tasks to be implemented for selecting and constructing a new landfill, and will develop the ancillary site features, support facilities (scale, access road, security fence, parking, office trailer, etc), and general engineering and construction costs associated with a new landfill.

STUDY FINDINGS

Based on the information presented in this report, the findings of the Feasibility Study are presented as follows:

- The existing Rio Rico Landfill will close in 2013 unless the site life is increased.
- The result of the Rio Rico Landfill vertical expansion analysis showed that the site life gained from the 28 feet vertical expansion is 4.35 years. The estimated construction cost is estimated at \$445, 547. To implement this option planning for

the vertical expansion must commence in 2008 or at least 5 years before the current projected closure date of 2013.

- The result of the Rio Rico Landfill horizontal expansion (Area A) analysis showed that the site life gain from this scenario is 3.56 years. The estimated construction cost, excluding the purchase of land, landfill gas (LFG) collection and control system, and LFG and groundwater monitoring is \$3,875,940. Like the vertical expansion above, it is expected that Area A will require a 5 year planning horizon to permit and construct.
- The result of the Rio Rico Landfill horizontal expansion (Area B) analysis showed that the site life gain from this scenario is 8.79 years. The estimated construction cost, excluding LFG collection and control system, and LFG and groundwater monitoring is \$5,425,942. Similarly to the vertical expansion and Area A expansion, Area B expansion will need at least five years to permit and construct.
- The combined site life gained from the Rio Rico Landfill vertical and horizontal expansions is 16.7 years, and the combined construction cost, excluding the purchase of land, LFG Collection and Control System, and LFG and groundwater monitoring, is \$9,747,429.
- The result of the Patagonia Landfill horizontal expansion analysis showed that the site life gained from this alternative is 5.35 years. The estimated construction cost, excluding LFG Collection and control system, and LFG and groundwater monitoring, is \$5,073,627.
- Based upon the closure of the Rio Rico Landfill in 2013, it is anticipated that a MRF would be a process to consider at the Rio Rico Landfill to extend the life of the landfill. For planning purposes, it is anticipated that a MRF would be in place by 2013, and the initial planning would start five years before then or in the year 2008.
- Assuming a 17-year life extension of the Rio Rico Landfill (from vertical and lateral expansions), it is also anticipated that a transfer station would be a process to consider at the Rio Rico Landfill in the year 2030. Similarly to the MRF, the initial planning for the transfer station would start in 2025.
- Based on review of the zoning map provided by the County, it was preliminarily
 determined that potential sites for a new landfill within Santa Cruz County would
 most likely be located along the Interstate 19 highway, 10-15 miles east or west of the
 highway.
- Based on comments received from private firms involved in MRFs, there are not enough recyclable materials at the present time, for private firms to participate in the addition of a full MRF at the Rio Rico Landfill.
- A single-stream MRF is a very expensive facility to operate. Additionally, single-stream MRFs have safety concerns, primarily at the sorting stations.

STUDY CONCLUSIONS

The specific study conclusions are as follows:

- The life gain of the Rio Rico Landfill varies from 3.56 to 16.7 years, depending on the expansion scenarios or combination of scenarios, selected by the County. Of the three expansion scenarios, the vertical expansion is the most economically feasible to implement initially.
- A single-stream MRF is a very expensive facility to operate. Additionally, single-stream MRFs have safety concerns, primarily at the sorting stations.
- The County, on their own, should consider the expansion of the existing recycling program by increasing the number of recycling centers within the County, and expanding the existing recycling facility at the Rio Rico Landfill.
- The County may want to consider an entry-level recycling program consisting of the addition of recycling drop-off centers within the County, and the expansion of the existing recycling facility at the Rio Rico Landfill. The expansion may involve the use of the bailing facility currently available at site, and the addition of equipment, such as a baler inlet feed hopper and chute, and baler compaction chamber.

2 DESIGN PARAMETERS

The design parameters for any of the alternatives considered as part of this study must have a site life of at 30 years. The reason for selecting the 30 year maximum period is that the life of constructed infrastructures, including buildings and mechanical processes, is typically 30 years.

TYPES, QUANTITIES AND COMPOSITION OF SOLID WASTE

Types

For the purposes of this study, the waste being considered for processing at the landfill(s) is solid waste, which is defined by the Arizona Revised Statutes (ARS), as any garbage, trash, rubbish, waste tire, refuse, sludge from a waste treatment plant, water supply treatment plant or pollution control facility and other discarded material, including solid, liquid, semisolid or contained gaseous material. This solid waste is collected from household, commercial and business establishments, and the non-manufacturing sector of industry such as shipping and office activities.

Quantities

The total quantity of solid waste handled by the Santa Cruz County solid waste management facilities in 2006 was 61,579 tons. Of this total, approximately 58,308 tons per year were disposed of at the Rio Rico Landfill, approximately 1,262 tons per year were disposed of at the Sonoita-Elgin Landfill, and 499 tons per year were disposed of at the Tubac-Amado Transfer Center, located at the closed Tubac-Amado Landfill. The remaining 1,510 tons per year were recycled through the County's drop-off recycling program, with locations at the Rio Rico Landfill, the Sonoita-Elgin Landfill, Tubac-Amado Transfer Center, and the Town of Patagonia. The 1,510 tons represent 2% of the total solid waste handled by the County. It should be noted that the quantity of recyclable materials handled by the County excludes the recyclable materials collected from the City of Nogales, which has its own recyclable program.

As part of the Phase I study, solid waste projections for the 30 year design period were developed. These projections are presented in Table 1.

Table 1. Waste Projections - Santa Cruz County

Year	Projected Waste (tons)	Waste Increase Rate
2006	61,579 ¹	
2007	65,274	6%
2008	69,190	6%
2009	73,342	6%
2010	77,742	6%
2011	82,407	6%
2012	84,879	3%
2013	87,425	3%
2014	90,048	3%
2015	92,749	3%
2016	95,532	3%
2017	98,398	3%
2018	101,350	3%
2019	104,390	3%
2020	107,522	3%
2021	110,748	3%
2022	114,070	3%
2023	117,492	3%
2024	121,017	3%
2025	124,647	3%
2026	128,387	3%
2027	132,238	3%
2028	136,206	3%
2029	140,292	3%
2030	144,500	3%
2031	148,835	3%
2032	153,301	3%
2033	157,900	3%
2034	162,637	3%
2035	167,516	3%
2036	172,541	3%

¹ Actual Tonnage Received at the Rio Rico Landfill

Composition

In October of 1992, SCS conducted an engineering feasibility study for a solid waste MRF to receive and process municipal solid waste from Santa Cruz County and the surrounding communities within the County.

As part of the 1992 study, SCS performed a 2-day physical waste sort at the Rio Rico Landfill. The information obtained from the waste sort detailed the types and amounts of specific constituents of the solid waste streams from the City of Nogales and other communities within the County. A summary of the waste sort is presented below.

Table 2. Summary of Waste Characterization-1992

Constituents	Sorted Waste Average (%)	Projected Composition for 50 tons per day Tons per Day	Recovery Rate of Products (Resalable) Average (%)
Paper	39.4	19.70	14.0
Plastics	11.6	5.80	1.7
Yard Waste	7.5	3.75	0.0
Organic Waste	30	15.00	0.0
Glass	3.4	1.70	2.6
Metals	5.4	2.70	5.1
Inorganics	1.3	0.65	0.0
Other Waste	1.4	0.70	0.0
Total	100.0	50.00	23.4

As shown in the above summary, and as reported in the 1992 study, the percent of solid waste within Santa Cruz County that is considered recyclable is approximately 23 percent. However, as stated in the Phase I Study, the 23 percent appears to be high, and a more reasonable percent could be in the 10-15 percent range.

Based upon the existing closure of the Rio Rico Landfill in the year 2013, it is anticipated that a MRF would be a process to consider at the Rio Rico Landfill for extending the life of the landfill. For planning purposes, it is anticipated that a MRF would be in place by the year 2013, and that the initial planning would start five years before then, or in the year 2008. Assuming a 17-year life extension of the Rio Rico Landfill (from vertical and horizontal expansions), it is also anticipated that a transfer station would be a process to consider at the Rio Rico Landfill in the year 2030. Similarly to the MRF, the initial planning for the transfer station would start in the year 2025.

Applying the sorted waste percentages from Table 2, with a revised recovery rate of 15 percent, and the projected tonnages from Table 1 for the year 2013, Table 3 presents the approximate

material composition at the time of implementation of a MRF. It should be noted that the 289 tons includes the recyclable materials from the City of Nogales, and that the City of Nogales is currently under contract with Nogales Recycling & Waste Services (NRWS) to sort and handle the recyclable materials from the City of Nogales until the year 2015. Excluding the estimated tonnage from the City of Nogales (approximately 75 tons per day), the total projected composition for the year 2013 would be 214 tons per day.

Table 3. Summary of Waste Characterization-2013

	Sorted Waste	Projected Composition for 289 tons per day	Recovery Rate of Products (Resaleable)
Constituents	Average (%)	Tons per Day	Average (%)
Paper	39.4	113.9	9.1
Plastics	11.6	33.5	1.1
Yard Waste	7.5	21.7	0.0
Organic Waste	30	86.7	0.0
Glass	3.4	9.8	1.5
Metals	5.4	15.6	3.3
Inorganics	1.3	3.8	0.0
Other Waste	1.4	4.0	0.0
Total	100.0	289.0	15.0

EXISTING SOLID WASTE MANAGEMENT SYSTEMS AND PLANS

Existing Systems Performing Solid Waste Functions

Currently, the City of Nogales and the Town of Patagonia provide solid waste collection, transportation, and/or disposal services for the residents of the County.

The City of Nogales' current solid waste management program, which is under the City's Public Works Department, includes the collection of solid waste, recyclable materials, and green waste. The collection of these materials is performed by City employees and City-owned vehicles.

The collected solid waste is taken (by City-owned vehicles) to a City-owned transfer station facility, where it is hand-sorted by NRWS personnel. The Recyclable materials are sold (by

NRWS) as raw material, and the non-recyclable material is transported (also by NRWS) to the Rio Rico Sanitary Landfill for final disposal.

The Town of Patagonia's current solid waste management program consists of a collection system and a disposal facility (the Patagonia Landfill). Solid waste within the Town is collected by Town employees and equipment. The solid waste collected is usually transported to the Patagonia Landfill. In addition to the Town's pick-up schedule, Town residents also deliver solid waste to the landfill in personal vehicles. The Town of Patagonia does not have a recycling program; however, the County operates a recycling drop-off facility in the Town.

The Patagonia Landfill, which is located approximately 2 miles north of the Town, consist of a 60-acre site, 23, of which is currently permitted by ADEQ, as a small (less than 20 tons of solid waste daily, based on an annual average) MSWL. The current landfill area consists of a 4-acre parcel; however, expansion is currently in the planning stages.

Due to the plans for expansion, the Town is temporarily disposing of the solid waste collected from the Town at the Rio Rico Landfill.

Santa Cruz County current solid waste management program includes four recycling drop-off facilities, two disposal facilities, and one transfer area. The recycling drop-off facilities at the Rio Rico and Sonoita-Elgin Landfills collect household recyclable waste, including waste tires and scrap metal. The recycling drop-off facilities at the Tubac-Amado Transfer Center and the Town of Patagonia do not collect waste tires and scrap metal. The two disposal facilities currently owned and operated by the County are the Rio Rico Landfill and the Sonoita-Elgin Landfill.

Collection of solid waste from the Sonoita-Elgin, Rio Rico, Tubac-Amado, and other areas within the County is accomplished by private waste haulers and individual hauling (where residents take their own solid waste to one of the County's two landfills). There are several companies within the County that provide solid waste collections to residents and commercial institutions within the County. With the exception of some solid waste from the Tubac-Amado area, all collected solid waste is disposed of at the Rio Rico Landfill. Some solid waste collected from the Tubac-Amado area is taken by private waste haulers to the Sahuarita Landfill, which is located in Pima County.

Currently, the Rio Rico Landfill, which occupies approximately 60 acres of land within a small canyon, serves as the main disposal facility for the County residents. The Sonoita-Elgin Landfill, which occupies approximately 40 acres of land, is currently serving as a Construction and Debris (C&D) landfill and as a household residential drop-off facility for the Sonoita-Elgin residents. The solid waste is temporarily stored in roll-off containers, and when full, the containers are taken to the Rio Rico Landfill. Approximately 10 roll-off boxes are taken to the Rio Rico Landfill on a monthly basis. The Tubac-Amado Transfer Center is currently used as household residential drop-off facility. The solid waste from the Tubac-Amado residents is also stored temporarily in roll-off boxes, and when full, the containers are taken to the Rio Rico Landfill. Approximately 6 roll-off boxes are taken to the Rio Rico Landfill on a monthly basis.

Future Plans

Based upon information obtained from conversations with representatives from the various communities within the County and review of available documentation on the existing solid waste management programs, the future plans for solid waste management for the City of Nogales, the Town of Patagonia, and Santa Cruz County are summarized below.

It is SCS' understanding that the City of Nogales has signed a solid waste management agreement with NRWS for the management of solid waste generated within the City, and that the agreement will expire in the year 2015. Based on this understanding, it is expected that the City of Nogales will continue with the current solid waste management program, at least until the year 2015.

The Town of Patagonia also plans to continue the management of the solid waste generated by the Town, using the current management practices. As the population of the Town, and consequently, the amount of solid waste increases, additional personnel and equipment will be required to manage the solid waste increase. The current landfill expansion has been designed to handle the solid waste needs of the Town for the next 10 years.

Future plans for the County include the search for cost-effective environmentally sound disposal alternatives prior to the expected closure of the Rio Rico Landfill in 2013. The potential addition of a MRF and a transfer station at the Rio Rico landfill, are also included in the County's future plans. Another future plan for the County is the addition of recycling drop-off facilities at convenient locations within the County.

Present System Problems and Constraints

Since there was no opportunity to obtain information from the City of Nogales or NRWS regarding the current solid waste management program, there is no knowledge of any system and/or constraints with the present program.

For the town of Patagonia, there are no known problems and constraints associated with the current solid waste management program. With the small quantity of waste generated by the Town, the current program in place is capable of handling the solid waste needs of the community.

The present problem with Santa Cruz County is that the Rio Rico Landfill is rapidly reaching its permitted capacity, and that unless sound disposal alternatives are implemented by the year 2013, the County will run out of disposal facilities. Should no action be taken in implementing disposal alternatives within the County by 2013, the County would be forced to dispose of its solid waste outside the County, at a much higher disposal rate than currently in place.

3 LANDFILL SITING CONSIDERATIONS

Due to past problems sometimes associated with landfills that were poorly designed, or were located in geologically unsound areas, the Federal, State and Local governments have developed regulations to greatly reduce the possibility that landfills will become sources of pollution.

Under the RCRA Subtitle D regulations, new and lateral expansions of MSWLF have location restrictions regarding airports, floodplains, wetlands, seismic impact zones and fault areas, and unstable areas.

Regarding airports, it is known that landfills can attract birds that can interfere with aircraft operations. Therefore, owners/operators of sites near airports must show that birds are not a danger to aircrafts.

Landfills may not be located in areas that are prone to flooding, unless the owner/operator can prove that the landfill is designed to withstand flooding and prevent the waste from washing out. Owners and operators of a new landfill must demonstrate that the landfill will not restrict the flow of the 100-year flood, reduce the temporary water storage capacity of the floodplain, or result of a washout of solid waste so as to pose a hazard to human health and the environment.

Since wetlands are important ecological resources, new landfills may not be built in wetlands, unless the landfill is in a state or on tribal lands with an EPA-approved program, and the owner/operator can show that it will not pollute the area.

Regarding fault areas, new landfills shall not be located within 200 feet of a fault that has displacement in Holocene time, unless the owner or operator demonstrates that an alternative setback distance of less than 200 feet will prevent damage to the structural integrity of the new landfill and will be protective of human health and the environment.

Once a potential site is located for a future landfill, the following tasks need to be implemented in order to successfully site any new landfill.

AERIAL MAPPING

Ground control aerial, and base map survey required for preparation of final design will be performed. The completed base maps will include all known existing facilities on which final design of the proposed facilities can be prepared.

Horizontal and vertical control will be established throughout the project area to provide a permanent reference for all future design and construction surveying. Targets for aerial mapping will be placed and surveyed for horizontal and vertical locations. Visible utility structures, such as manhole covers, valve cover, and catch basin gates, will be marked with paint to ensure their visibility in the aerial photography. Aerial mapping and preparation of digitized maps will be prepared by licensed aerial mapper. SCS Engineers recommends a scale of 1"= 50' be used to prepare the map.

As-built records of existing utilities will be consulted to aid in field location of these facilities. The field surveys will include the location and preparation of existing monuments; location of existing utilities, including storm sewers, waterlines, and underground power and telephone structures; and topographical location of any other existing features in the vicinity of the project necessary for design.

Data from existing as-built records and field surveys will be recorded on the aerial plot plan.

HYDROGEOLOGIC INVESTIGATION

The construction of a new Municipal Solid Waste Facility is primarily dependent on the ability to design features into the landfill to protect existing groundwater resources such as:

- Preparation of Groundwater Gradient Map.
- Water Quality Sampling
- Groundwater Monitoring System
- Surface Water Drainage Evaluation

GEOLOGIC INVESTIGATION

The geologic portion of the feasibility study will focus on characterizing geologic materials in the areas of the anticipated expansion with respect to engineering characteristics, developing geologic-seismic data for engineering design of slopes and investigating geologic structural features to correlate with subsurface exploration data.

- Geologic Mapping of Site
- Seismicity Refraction Survey
- Geologic-Seismicity Data

LANDFILL GAS COLLECTION PLAN

Federal regulations require that landfills with design capacity greater than or equal to 2.5 million megagrams by mass or 2.5 million cubic meters by volume, and with calculated emission rates greater than or equal to 50 megagrams per year, must submit within 12 months, a Landfill Gas (LFG) Collection and Control System (GCCS) plan. The GCCS shall be either an active or passive system. Additionally, the landfill owner or operator must comply with all operational standards and testing, monitoring, reporting and record keeping requirements.

CONCEPTUALIZED FACILITIES

During this phase of facility development the County will need to take into consideration the data gathered from the hydrogeologic and geologic investigations and compare it with the basic regulatory design criteria and prepare the conceptual design necessary to address the site specific conditions required, as a result of interfacing with the various regulatory agencies and Santa Cruz County. The engineering planning drawings prepared would include all major environmental control systems needed, but would not contain sufficient details necessary for construction.

LANDFILL OPERATIONS PLAN

A preliminary landfill operation plan will be developed jointly with the Santa Cruz County . This plan will identify methods of operation for the facility, including operational protection measures that will be addressed in addition to equipment needs type and number. Also staffing requirements and number of personnel will be addressed.

ANCILLARY FACILITIES

A preliminary design of ancillary facilities such as equipment maintenance buildings, office buildings, and weigh stations will be developed based upon input from Santa Cruz County will need to be prepared.

LANDFILL FINAL ELEVATION & DEVELOPMENT PLAN

A final elevation and development plan will need to be prepared for the proposed new landfill detailing initial site excavation and stockpiling; fill sequencing; cover excavation; surface drainage control; and site access roads. During the development plan integration of the major environmental control systems will be prepared. Through this process schedules for construction will be planned on a preliminary basis to coordinate the various elements. It is anticipated that at least two development plans will be developed having different elevation contour configurations and therefore different filling sequences.

PRELIMINARY DESIGNS

Work in this task includes preliminary engineering design for the preferred project. It includes a further refinement of the conceptualized facility plans prepared during Section 4.0 conceptualized facilities and will contain preliminary drawings and specifications. The drawings and specifications will be based on a format approved by Santa Cruz County during the conceptual design phase and will be submitted at appropriate times to the regulatory agencies.

LINER/LEACHATE CONTROL

A design, including a leachate collection and removal system (LCRS), will need to be prepared for the preferred liner. Methods for pumping and treatment of leachate collected from a LCRS will be addressed as necessary.

DRAINAGE CONTROL

A drainage control plan will need to be developed to provide a run - on and run-off control systems to prevent flow onto and into the active portion of the landfill during the peak discharge of a 25-year storm. This element will provide the plans necessary to move the current drainage system from the middle of the site to along the perimeter of the landfill. The plan will also address the need for retention basins to provide run-off control from the active portion of the landfill to collect and control at least the water volume resulting from a 24-hour, 25-year storm.

SEISMIC DESIGN

The seismic design plan will need to determine the expected peak ground acceleration and determine the appropriate design parameter for cut slope stability, fill slope stability, containment structures and ancillary facilities.

GROUNDWATER MONITORING

A state licensed land surveyor will provide coordinates and reference elevations for exploration points, piezometer, and pumping wells. Accurate locations of exploratory borings, if necessary, are required referencing proposed project excavation and facilities.

LANDFILL GAS MONITORING

Preliminary Designs for the gas system would be integrated with the overall landfill project during this design element. It is anticipated that any proposed gas system would collect the landfill gas through a series of vertical and horizontal wells and transport the gas via collection header to a flare station. To demonstrate compliance with the rules, the designs will incorporate the monitoring of a series of multi-depth monitoring probes around the perimeter of the site with an emission monitoring program.

QUALITY ASSURANCE QUALITY CONTROL PLAN

Another requirement for a new landfill is the Construction Quality Assurance (CQA) and Construction Quality Control (CCQ) Plans. For each specified phase of construction, CQA and CQC Plans shall be submitted to ADEQ for approval, prior to the start of the construction activity. Included in the plans will be a delineation of responsibilities of the quality assurance management organization, a description of the required level of experience and training of the contractor and subcontractor's crew, and a description of the quality assurance and quality control testing protocols for every major phase of the construction.

4 REGULATORY AGENCIES

The goal of the EPA's RCRA Subtitle D is to establish a framework for Federal, State and Local government cooperation in controlling the management of solid waste. There are in Arizona several agencies that may have regulatory authority over the solid waste management facilities anticipated in this study. Depending upon the type, size, and location of any of the proposed facilities the kind of permits and review process could be complex and time consuming.

AGENCY CONSTRAINTS

Federal

U.S Army Cops of Engineers (COE)

Any solid waste management facility located in the Army Corp jurisdiction (adjacent wetlands to water of the United States) would require a permit from the Army Corps.

U.S Environmental Protection Agency (EPA)

Solid waste management facilities must meet all applicable standards set by EPA. Most but not all of these standards are administered and enforced by authorized State and Local agencies.

State

Arizona Department of Environmental Quality (ADEQ)

In the State of Arizona, ADEQ is the lead agency responsible for implementing and enforcing the rules and regulations associated with solid waste management. ADEQ has recently published the draft Integrated Solid Waste Rules for solid waste management. These rules are intended to address the permitting, construction and operation and maintenance of solid waste facilities, including landfills, transfer stations, compost operations and MRFs.

Arizona Department of Game and Fish

Any proposed solid waste facilities sited in sensitive animal habitat would usually be reviewed by Fish and Game for endangered species and potential impacts on fish and game resources.

Arizona State Land Department

Any solid waste facilities that intrude into parcels that is on State lands would come under the jurisdiction of this agency.

Arizona State Parks - State Historic Preservation Office

The State Historic Preservation Office (SHPO), a division of Arizona State Parks, is responsible for the identification, evaluation, and protection of Arizona's prehistoric and historic cultural

resources. Through the review and compliance program, the SHPO assists Federal, State and Local agencies in meeting their preservation responsibilities as defined by Federal and State laws.

Santa Cruz County and County Agencies

Traditionally, local governments have been solely responsible for controlling the use of land within their political jurisdiction. Their primary purpose is to protect human health and welfare. To adequately consider a wide range of local concerns in its decision-making process, local governments prepare plans, policies and ordinances to assist decision makers in determining compatibility of proposed land uses. Zoning ordinances specify permitted uses within Santa Cruz County. The purposes of such zoning ordinances are to ensure that the proposed use is compatible with the surrounding existing uses. These determinations are usually made by the respective planning departments. The planning department aided by the planning commission acting through an elected body such as Santa Cruz County Boards of Supervisors, determine whether or not a solid waste management facility is consistent with the County's public health and welfare.

The application for a local land use permit is usually the first step in the permit process. Often other agencies will delay processing the application until local approval is given.

Component Siting

For the purposes of this study the Rio Rico Landfill will be sited and considered for horizontal and vertical expansion. Material Recovery Facilities will be sited and considered at the Rio Rico landfill within five (5) years of the current (with no expansions) closure year of 2013. The transfer stations will be sited and considered to be implemented at the Rio Rico landfill five years (5) before commencing its final (including proposed expansions and MRF addition) closure activities.

Siting for the retrofitting of the Patagonia landfill, although technically and environmentally possible, its implementation largely depends on a number of economic and political issues.

Siting for a new landfill will depend upon general locations identified by Santa Cruz County.

5 CONCEPTUALIZED FACILITIES

INTRODUCTION

As stated in previous sections of this report, any lateral expansions of an existing landfill must comply with RCRA Subtitle D regulations. Thus, in developing the conceptual design drawings, engineering calculations and preliminary cost estimates, SCS has taken these considerations into account.

RIO RICO LANDFILL EXPANSION

Rio Rico Landfill

Vertical Expansion

The vertical expansion of the Rio Rico Landfill consists of raising the permitted final grades of the top deck of the landfill, 28 feet.

As part of the analysis of the vertical expansion, SCS developed a conceptual design, site capacity and life increase calculations, and preliminary cost estimates. The conceptual design drawing for the vertical expansion, shown on Sheet 1 (Final Refuse Plan-Vertical Expansion) in Appendix A, involves preliminary design features such as the steepening of the front slopes to 2.5 to 1 overall; the provision of 15-feet wide benches, at 50 feet vertical intervals; and the rerouting of the main access road along the southern perimeter of the landfill.

The following information provides assumptions, calculations and results of the site capacity and life increase accomplished by the vertical expansion of the Rio Rico Landfill. As indicated below, the site life gain from the 28 feet vertical expansion is 4.35 years.

Daily Cover Soil: Refuse Ratio (1:5)	0.17
In-place Density of Refuse (1,354 lbs/cy)	0.55
Average Disposal Rate (tons/year)	102,000
Airspace Gain (2006 topo vs final contours)	968,000 cy
Daily Cover Soil Volume	161,333 су
Refuse Volume Gain	806,667 cy
Refuse Tonnage Gain	443,667 tons
Site Life Gain	4.35 years

The estimated construction cost of the vertical expansion is \$445,547. This cost estimate includes the cost of engineering and permitting, the construction of a new access road along the

southern perimeter of the landfill, the enlargement of the existing sedimentation basin, and surveying services.

Horizontal (Lateral) Expansion

The lateral expansion of the Rio Rico Landfill involves two separate areas, Area A and Area B. Area A is located southeast of the existing landfill and Area B is located northeast of the existing landfill. A small portion of Area A lies within the existing property boundary; however, the major portion of this area lies beyond the property boundary. All of Area B lies within the existing property boundary. The conceptual design drawings for the horizontal expansion of Area A are shown on Sheets 2 and 3 (Rio Rico Horizontal Expansion-Area A) in Appendix A, and the conceptual design drawings for the horizontal expansion of Area B are shown on Sheets 4 and 5 (Rio Rico Horizontal Expansion-Area B) in Appendix A.

The following information provides assumptions, calculations and results of the site capacity and life increase accomplished by the horizontal expansion of the Rio Rico Landfill (Area A). As indicated below, the site life gain from the horizontal expansion of Area A is 3.56 years.

Base/Slope Liner Area	10.25 acres
Daily Cover Soil: Refuse Ratio (1:5)	0.17
In-place Density of Refuse (1,354 lbs/cy)	0.67
Average Disposal Rate (tons/year)	102,000
Airspace Gain (2006 topo vs. final contours)	650,000 cy
Daily Cover Soil Volume	108,333 cy
Refuse Volume Gain	541,667 cy
Refuse Tonnage Gain	362,917 tons
Site Life Gain	3.56 years

The estimated construction cost of the horizontal expansion of Area A is \$3,875,940. This cost estimate includes the cost of engineering and permitting, the excavation of the cell area, slope and base liners, a leachate collection and recovery system, a leachate holding tank and handling system, access road extension to the new cell, rerouting of the perimeter drainage around the new cell, enlargement of the existing sedimentation basin, surveying services, and CQA services and report.

The following information provides assumptions, calculations and results of the site capacity and life increase accomplished by the horizontal expansion of the Rio Rico Landfill (B). As indicated below, the site life gain from the horizontal expansion of Area B is 8.79 years.

Base/Slope Liner Area	11.65 acres
Daily Cover Soil: Refuse Ratio (1:5)	0.17
In-place Density of Refuse (1,354 lbs/cy)	0.677
Average Disposal Rate (tons/year)	102,000
Airspace Gain (2006 topo vs. final contours)	1,590,052 cy
Daily Cover Soil Volume	265,009 cy
Refuse Volume Gain	1,325,043 cy
Refuse Tonnage Gain	897,054 tons
Site Life Gain	8.79 years

The estimated construction cost of the horizontal expansion of Area B is \$5,425,942. This cost estimate includes the cost of engineering and permitting, the excavation of the cell area, slope and base liners, a leachate collection and recovery system, a leachate holding tank and handling system, access road extension to new cell, re-routing of the perimeter drainage around the new cell, enlargement of the sedimentation basin, surveying services, and CQA services and report.

Summarizing the results of the Rio Rico Landfill vertical and horizontal expansions, the total site life gain from the three expansions is 16.7 years, and the total construction cost is \$9,747,429. It should be noted that by increasing compaction rates and reducing soil consumption for daily cover, the site life gain can be increased by approximately 10 %.

Material Recovery Facility

Based upon the results of the Rio Rico Landfill vertical and horizontal expansions, it is apparent that in order to increase the life of the Rio Rico Landfill, a solid waste reduction system would be beneficial to implement by the County, in conjunction with the landfill expansions.

As part of the evaluation process, SCS contacted four private firms to determine the firms' interest in working with the County in adding a MRF at the Rio Rico Landfill. Of the four firms contacted, SCS and the County met with two of the private firms. A summary of some of the private firms' comments regarding the addition of a MRF at the Rio Rico Landfill is presented below.

- Based on the current and projected County population and projected recyclable materials, there does not appear to be enough volume to add a full MRF in Santa Cruz County, in the near future.
- A single-stream MRF is a very expensive facility to operate. Additionally, single-stream MRFs have safety concerns, primarily at the sorting stations.

- A single-stream MRF is a very expensive facility to operate. Additionally, singlestream MRFs have safety concerns, primarily at the sorting stations.
- The County may want to consider an entry-level recycling program consisting of the addition of recycling drop-off centers within the County, and the expansion of the existing recycling facility at the Rio Rico Landfill. The expansion may involve the use of the bailing facility currently available at site, and the addition of equipment, such as a baler inlet feed hopper and chute, and baler compaction chamber.

Transfer Station

Based upon the results of the Rio Rico Landfill expansions, by the year 2030, there will be a need for a transfer station to continue the management of the solid waste generated by the County for the 30 year study period (2036) and beyond. The planning for the addition of a transfer station will start in the year 2025.

Based on the projections developed in the Phase I study, by the year 2030 the quantity of solid waste to be generated by the County will be approximately 144,500 tons per year or approximately 478 tons per day. To accommodate the projected waste, the transfer station facility will be designed to process approximately 475 to 500 tons per day.

Patagonia Landfill Expansion

The Patagonia Landfill is located within an area of approximately 80 acres, 23 of which is currently permitted by ADEQ as a MSWLF. There are no infrastructures or utilities at the landfill site and the access road from the main highway (State Route 82) to the landfill (approximately 1.8 miles) consists of a dirt road that crosses a creek.

Based upon the existing conditions of the Patagonia Landfill and the needs of the County, the Patagonia Landfill Retrofit involves a lateral expansion, the addition of infrastructure required for the proper operation of a full-service MSWLF, the addition of utilities, and the improvement of the existing access road.

The lateral expansion of the Patagonia Landfill involves an area located in the southeastern portion of the landfill property. This area is shown on sheets 7 and 8 (Patagonia Horizontal Expansion) in Appendix A.

The following information provides assumptions, calculations and results of the site capacity and life increase accomplished by the Patagonia Landfill expansion. As indicated below, the site life gain from the Patagonia Landfill expansion is 4.67 years.

Base/Liner Slope Area	10.79 acres
Daily Cover Soil: Refuse Ratio (1:5)	0.17
In-place Density of Refuse (1,354 lbs/cy)	0.677
Average Disposal Rate (tons/year)	102,000

Airspace Gain (2006 topo vs. final contours)	1,171,146 cy
Daily Cover Soil Volume	161,333 cy
Refuse Volume Gain	975,955 cy
Refuse Tonnage Gain	536,775 tons
Site Life Gain	4.67 years

The estimated construction cost of the horizontal expansion area is \$5,073,627. This cost estimate includes the cost of engineering and permitting, the excavation of the cell area, slope and base liners, a leachate collection and recovery system, a leachate holding tank and handling system, access road upgrade, enlargement of the existing sedimentation basin, surveying services, and CQA services and report.

New Landfill

As part of the Phase II study, SCS reviewed a zoning map provided by Santa Cruz County. The map identified several parcels of land that are zoned GR, within 15 miles of a State or Interstate highway, and are not in the current or future FEMA floodplains or within 500 feet of the locally regulatory floodplains. Specific data on any of the sites identified by the County (aerial mapping, hydrogeologic data, geologic data, etc.) were not provided and were not required as part of this preliminary process.

Based on the zoning map review, it was preliminarily determined that potential sites for a new landfill within Santa Cruz County would most likely be located along the Interstate 19 highway, 10-15 miles east or west of the highway. The primary constraint with areas along State Highways 82 and 83 would be the heavy traffic associated with the hauling of solid waste through the small communities.

Another factor to consider in selecting a new landfill site is the haul distance from the Rio Rico Landfill to the new landfill site. This haul distance would result in an additional cost to the County, especially if the new landfill is located in the northwest corner of the County. SCS has estimated the maximum distance from the Rio Rico Landfill to the northwest corner of the County as 30 miles.

General costs associated with the construction of a new landfill, including the additional hauling costs, are presented in Section 6 (Economic Cost Analysis).

6 ECONOMIC COST ANALYSIS

INTRODUCTION

Table 4 presents a summary of the estimated engineering and construction costs for the landfill expansions at the Rio Rico Landfill (horizontal and vertical), and the lateral expansion at the Patagonia Landfill. The estimated costs for the Rio Rico and Patagonia Landfill expansions were developed from the conceptual designs prepared for these alternatives. For the new landfill alternative, site specific costs were not developed; rather, general costs, similar to those presented in the Fatal Flaw Analysis report were used. It should be noted that the estimated costs described in this section excludes the cost of LFG collection and control systems, LFG and groundwater monitoring, land purchase, and ancillary structures and facilities associated with a new landfill.

ESTIMATED COSTS OF THE RIO RICO LANDFILL EXPANSIONS

As shown on Table 4, the total estimated cost of the vertical expansion at the Rio Rico Landfill is \$445, 547. This estimate includes \$75,000 for design and permitting and \$370,547 for the construction of a new access road along the southern perimeter, three access road crossings, the vertical extension of the existing view berm, the enlargement of the existing sedimentation basin, and survey services.

The total estimated cost of Area A (horizontal expansion) is \$3,875,940. This estimate includes \$150,000 for design and permitting and \$3,725,940 for clearing and grubbing, the excavation of the cell area, the installation of slope and base liners, the leachate collection and recovery system (LCRS), access road extension, one access road crossing, re-routing of the southern perimeter drainage, the enlargement of the existing sedimentation basin, survey services, and construction quality assurance (CQA) services and the construction documentation report.

The excavation of the cell area includes the clearing and grubbing of approximately 10.25 acres and the cut (no blasting) of approximately 653,000 cubic yards of materials. The slope liner installation includes the installation of 3.41 acres of geomembrane only, and the base liner includes the subgrade preparation, and the installation of 6.84 acres of geocomposite liner (GCL) and geomembrane. The LCRS includes the gravel and the piping for the base area, and a leachate holding tank and handling system. The access road extension to the new cell (approximately 400 linear feet long and 40 feet wide), includes approximately 1,000 cubic yards of grading, 520 tons of six inches of crushed aggregate base (CAB) and approximately 300 tons of 3 inches of asphalt cement (AC). The view berm modification includes a 30-foot vertical extension. The re-routing of the southern perimeter drainage around the new cell (approximately 2,000 linear feet) includes approximately 6,667 cubic yards of excavation (v-ditch, 6 feet deep, 24 feet wide) and 56,000 square feet of 3-inch thick shotcrete. The enlargement of the existing sedimentation basin assumes a 50% or 2 acre enlargement.

The total estimated cost of Area B (horizontal expansion) is \$5,425,942. This estimate includes \$100,000 for design and permitting and \$5,325,942 for the excavation of the cell area, the installation of slope and base liners, the leachate collection and recovery system (LCRS), access

Table 4. Estimated Costs - Landfill Expansions

	RR Landfill Vertical Expansion	RR Landfill Horizontal Expansion (Area A)	RR Landfill Horizontal Expansion (Area B)	Patagonia Landfill Expansion
	Estimated	Estimated Cost	Estimated	Estimated
Item	Cost	S S	Cost	Cost
nem	S	ϕ	S	S
Design and Permitting	75,000	150,000	100,000	250,000
Clearing and Grubbing		30,750	34,962	32,369
Excavation of Cell area			<u></u> _	,
(cut)		1,306,000	3,361,410	414,815
Slope Liner				,-
(geomembrane only)		170,500	496,608	401,745
Base Liner (GCL and			,	, , , , , , ,
geomembrane)		615,600	154,959	247,934
LCRS (base area only)		51,300	12,913	20,661
Leachate Holding Tank				
	_	25,000	25,000	25,000
New access Road (2,000				
lf)	246,000			
Access Road				
Improvement (1.8 mi.)				2,553,232
Access Road				
Extension/Realignment		50,200	150,600	
Access Road Crossing of				
Drainage Channel	15,000	50,000	50,000	
View Berm Modification (30'Hx500'L)				
,	2,222			
Re-routing of South				
Perimeter Drainage		573,333		
Sedimentation Basin			·	
Enlargement	18,067	32,267	20,167	32,267
Survey Services	15,000	25,000	15,000	50,000
CQA and Report		150,000	100,000	200,000
SUBTOTAL	371,289	3,229,950	4,521,618	4,228,022
Contingency (20%)	74,258	645,990	904,324	845,604
TOTAL	445,547	3,875,940	5,425,942	5,073,627

road re-alignment, one access road crossings (of drainage channel), the enlargement of the existing sedimentation basin, survey services, CQA services and the construction documentation report.

The excavation of the cell area includes the clearing and grubbing of approximately 11.65 acres and the cut (no blasting) of approximately 1,120,470 cubic yards of material. The slope liner installation includes the installation of 9.93 acres of geomembrane only, and the base liner includes the subgrade preparation, and the installation of 1.72 acres of geocomposite liner (GCL) and geomembrane. The LCRS includes the gravel and the piping for the base area, and a leachate holding tank and handling system. The access road re-alignment (approximately 1,200 linear feet long), includes approximately 3,000 cubic yards of grading, 1,560 tons of six inches of CAB and approximately 900 tons of 3 inches of AC. The enlargement of the existing sedimentation basin assumes a 25% or 1.25 acre enlargement.

Excluded from the above estimates is the cost of purchasing the land needed for the full expansion of Area A.

ESTIMATED COSTS OF THE PATAGONIA LANDFILL EXPANSION

The total estimated cost of the Patagonia Landfill expansion is \$5,073,627. This estimate includes \$250,000 for design and permitting and \$4,823,627 for the excavation of the cell area, the installation of slope and base liners, the leachate collection and recovery system (LCRS), access road improvement, the enlargement of the existing sedimentation basin, survey services and CQA services and the construction documentation report.

The excavation of the cell area includes the clearing and grubbing of approximately 10.79 acres and the cut (40 feet at base, 20 feet on slopes) of approximately 207,407 cubic yards of materials. The slope liner installation includes the installation of 8.03 acres of geomembrane only, and the base liner includes the subgrade preparation, and the installation of 2.75 acres of geocomposite liner (GCL) and geomembrane. The LCRS includes the gravel and the piping for the base area only, and a leachate holding tank and handling system. The access road construction (approximately 1.8 miles long) includes approximately 50,000 cubic yards of grading, 12,355 tons of six inches of CAB, approximately 7,128 tons of 3 inches of AC, 11 CMP culverts (6 per mile, 36-54 inches in diameter, 50 feet long), and one bridge crossing. The enlargement of the existing sedimentation basin assumes a 5 feet deep, 2 acre enlargement.

Excluded from the above costs are ancillary costs for structures and facilities. Typical costs for these structures and facilities range from \$700,000 to \$1,000,000 for on-site buildings and \$100,000 to \$150,000 for each truck scale.

ESTIMATED COSTS OF NEW LANDFILL

Since no specific locations were selected for a new landfill site, the following are general costs associated with constructing a new landfill. Typical costs to construct a new landfill include clear and grub, site survey, excavation of the cells, slope and base liner construction, LCRS, perimeter berm, and CQA services and construction documentation report.

Depending on the nature and extent of the existing vegetation at the selected site, the cost of clearing and grubbing can range from \$1,000 to \$4,000 per acre. Following the clearing and grubbing activity, the site will be surveyed to establish benchmarks, locate site features, and stake the construction areas. The cost of surveying typically ranges from \$5,000 to \$8,000 per acre. Depending on the type of soils to be excavated, the cost of excavation (no blasting) can run from \$100,000 to \$330,000 per acre. Typical costs of slope and base liner construction range from \$180,000 to \$310,000 per acre. The cost of a LCRS, which includes a collection pipe, a leachate sump and riser, leachate force mains, and a leachate storage tank, run from \$8,000 to \$12,000 per acre. The construction cost of the perimeter berm, constructed along the landfill's perimeter to provide anchoring for the liner elements and structural toe stability for the solid waste slopes, vary from \$10,000 to \$16,000 per acre. The final cost associated with the construction of a new landfill is the CQA services and the preparation of a construction report. These costs, which include construction oversight of the earthwork, liner, leachate management system, construction surveying and drawings, and overall project management, range from \$75,000 to \$100,000 per acre. Table 5, present a summary of typical landfill construction costs.

Table 5. Typical Landfill Construction Costs

Activity	Cost per acre (\$)
Clear and Grub	1,000 - 4,000
Site Survey	5,000 - 8,000
Excavation	100,000 – 330,000
Perimeter Berm	10,000 – 16,000
Liner Construction	180,000 – 310,000
LCRS Construction	8,000 – 12,000
CQA and Report	75,000 – 100,000
Total	379,000 – 780,000

Additional costs associated with a new landfill, and not included above, are the landfill siting costs, engineering and permitting costs, land purchase, and ancillary structures and facilities. Landfill siting and engineering and permitting costs typically range from \$1,000,000 to \$1,500,000. Land purchase costs vary widely, depending on the location of the landfill site. Ancillary structures and facilities costs range from \$700,000 to \$1,000,000 for on-site buildings (office and maintenance); \$100,000 to \$150,000 for each modular truck scales and associated computer systems; \$150,000 to \$250,000 for wheel wash facilities; and access road within the landfill can range from \$150,000 to \$250,000. The estimated hauling cost from the Rio Rico Landfill to the new landfill site is about \$0.25 per ton per hauling mile.

7 IMPLEMENTATION PLAN

PROJECT DEVELOPMENT

While every solid waste management facility project is unique and has specific characteristics relating to region and participants, the development process tends to proceed according to the following sequences:

- Phase I-Fatal Flaw for Conceptualized Facilities
- Phase II-Feasibility Analysis
- Phase III-Implementation Planning
- Phase IV-System Procurement
- Phase V-Construction
- Phase V-Operation

Phase I — Fatal Flaw Analysis for Conceptualized Facilities

This is the idea or "what if" phase of a project initiation. Concepts for evaluation are researched and sketched out in words for practical consideration in the study. In this case, a Phase I report completed in July 2007 outlined nine concept facilities as determined by the County to represent a broad spectrum of potential facilities intended to be a replacement for the Rio Rico landfill in its current configuration. The purpose of the study was to identify engineering, economic, or regulatory constraints that would make the implementation of any of the conceptual facilities impractical or impossible. The three highest ranking projects surviving this initial screening would be considered for more detailed evaluation in a feasibility study.

Phase II - Feasibility Analysis

Phase II, the subject of this report, analyzes in more detail the technical, economic, and environmental feasibility of the most promising three solid waste facilities recommended in Phase I. As part of this detailed analysis, concerns such as:

- Quantity of municipal wastes
- Regulatory agency requirements
- System components such as landfills, material recovery facilities, and transfer stations
- Costs

Based upon the results of the study, a "go/no-go" decision can be reached regarding the viability of continuing a specific project development. At this point, no binding commitment to implement the project is necessary. However, what is required is the decision to continue to plan

for the eventual implementation of one of the alternatives depicted in Section 5 Conceptualized Facilities.

In Section 6 Economic Cost Analysis, SCS investigated a number of concepts and presented construction costs associated with each alternative.

Phase III - Implementation Planning

The Third Phase – Implementation Planning will further define and refine the concepts developed in the First and Second Phase and to evaluate one or more site specific projects. Tasks to be undertaken include:

Clarification of Waste Control

If at some time in the future a Material Recovery Facility (MRF) is considered to be part of the Rio Rico landfill a determination of what processible waste is available and who controls it and how to gain control.

Definition of the Project

Depending upon whether the County selects a single project or multiple projects the County will need to refine and define the scenarios developed in Phase II incorporating the most up to date costs and waste stream data.

Identification and Evaluation of Specific Sites

Especially in the case of siting a new landfill the County must identify potential project sites based on factors such as environmental impact, community acceptance, availability, proximity to waste shed.

Develop Detailed Concepts and Cost Estimation of Selected Scenario Components

Revise and update as necessary design and cost estimates for appropriate scenario components.

Develop of Implementation Strategy

Develop an optimum institutional, financial and procurement plan.

Identification of Permits and Environmental Reports

Identify permits required and participants best qualified to obtain them. Identify environmental impact reporting requirements if any.

Phase IV - System Procurement

The outputs from the Third Phase study will provide the necessary inputs to Phase IV – System Procurement. Phase IV covers the steps for system procurement, including waste shed, construction, and operation (if applicable, contracts, necessary pre-construction permits and obtaining the capital to finance the project).

Phase V - Construction and Phase VI - Operation

The addition Phases V and VI illustrate the two major phases of a solid waste facility project for which the planning in Phases I, II, III, IV is conducted, Phase V includes construction, shakedown, and acceptance, which are generally a part of the construction contract. In the Architectural/ Engineering procurement approach, final design has already been completed in Phase IV; the Turnkey and Full Service approaches to the final design is included in Phase V. Phase V is virtually completed when Phase VI, the long-term operation of the facility commences.

APPENDIX A

- Sheet 1: Final Refuse Plan-Vertical Expansion, Rio Rico Landfill
- Sheet 2: Liner Plan-Horizontal Expansion Area A, Rio Rico Landfill
- Sheet 3: Refuse Fill Plan-Horizontal Expansion Area A, Rio Rico Landfill
- Sheet 4: Liner Plan-Horizontal Expansion Area B, Rio Rico Landfill
- Sheet 5: Fill Plan-Horizontal Expansion Area B, Rio Rico Landfill
- Sheet 6: Final Grading Plan, Patagonia Landfill
- Sheet 7: Horizontal Expansion Liner Plan, Patagonia Landfill
- Sheet 8: Horizontal Expansion Fill Plan, Patagonia Landfill











